

Dominion Nuclear Connecticut, Inc.  
Millstone Power Station  
Rope Ferry Road  
Watertford, CT 06385



**Dominion**

JAN 23 2004

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555

Serial No.:	04-024
NL&OS/MAE	Rev 0
Docket No.:	50-336
License No.:	NFP-49

**DOMINION NUCLEAR CONNECTICUT, INC. (DNC)**  
**MILLSTONE POWER STATION, UNIT NO. 2**  
**LICENSEE EVENT REPORT 2003-006-00**  
**TWO MANUAL REACTOR TRIPS DUE TO TURBINE TRIPS**  
**CAUSED BY TURBINE VIBRATIONS**

This letter forwards Licensee Event Report (LER) 2003-006-00, which documents two events at Millstone Power Station, Unit No. 2, which occurred on November 27 and November 28, 2003. This LER is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A), any event or condition that resulted in manual or automatic actuation of reactor protection system.

There are no regulatory commitments contained within this letter.

If you should have any questions regarding this submittal, please contact Mr. David W. Dodson at (860) 447-1791, extension 2346.

Very truly yours,

  
J. Alan Price  
Site Vice President - Millstone

Attachment (1)

JE22

cc: H. J. Miller  
U. S. Nuclear Regulatory Commission  
Region I  
475 Allendale Road  
King of Prussia, PA 19406-1415

Mr. R. M. Pulsifer  
NRC Project Manager  
U. S. Nuclear Regulatory Commission  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852-2738

Mr. S. M. Schneider  
NRC Senior Resident Inspector  
Millstone Power Station

The Director, Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

**Attachment 1**

**Millstone Power Station, Unit No. 2**

**LER 2003-006-00**

**Dominion Nuclear Connecticut, Inc.**

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to [bja1@nrc.gov](mailto:bja1@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEDB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

## FACILITY NAME (1)

Millstone Power Station - Unit No. 2

## DOCKET NUMBER (2)

05000336

## PAGE (3)

1 OF 3

## TITLE (4)

Two Manual Reactor Trips Due to Turbine Trips Caused by Turbine Vibrations

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	27	2003	2003	006	00	01	23	2004	FACILITY NAME	DOCKET NUMBER
										05000
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)							
POWER LEVEL (10)		20	20.2201(b)			20.2203(a)(3)(II)			50.73(a)(2)(B)	50.73(a)(2)(ix)(A)
			20.2201(d)			20.2203(a)(4)			50.73(a)(2)(III)	50.73(a)(2)(x)
			20.2203(a)(1)			50.36(c)(1)(I)(A)		X	50.73(a)(2)(iv)(A)	73.71(a)(4)
			20.2203(a)(2)(I)			50.36(c)(1)(B)(A)			50.73(a)(2)(v)(A)	73.71(a)(5)
			20.2203(a)(2)(II)			50.36(c)(2)			50.73(a)(2)(v)(B)	OTHER
			20.2203(a)(2)(III)			50.48(a)(3)(II)			50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(IV)			50.73(a)(2)(I)(A)			50.73(a)(2)(v)(D)	
			20.2203(a)(2)(V)			50.73(a)(2)(I)(B)			50.73(a)(2)(vII)	
			20.2203(a)(2)(VI)			50.73(a)(2)(I)(C)			50.73(a)(2)(vIII)(A)	
			20.2203(a)(3)(I)			50.73(a)(2)(II)(A)			50.73(a)(2)(vIII)(B)	

## LICENSEE CONTACT FOR THIS LER (12)

## NAME

David W. Dodson, Licensing Supervisor.

## TELEPHONE NUMBER (Include Area Code)

860-447-1791, Ext. 2346

## COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

## SUPPLEMENTAL REPORT EXPECTED (14)

☐

YES (If yes, complete EXPECTED SUBMISSION DATE).

☐

NO

EXPECTED  
SUBMISSION  
DATE (15)

MONTH

DAY

YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On November 27, 2003, at approximately 0617 with the plant in MODE 1 at approximately 20 percent power, the reactor was manually tripped due to high vibration of the Main Turbine. Additionally, on November 28, 2003, at approximately 2205 with the plant in MODE 1 at approximately 11 percent power the reactor was also manually tripped due to high vibration of the Main Turbine. Following the manual reactor trips, all control rods inserted into the core. There were no safety system actuations. All electrical busses transferred properly following the trip, and all emergency diesel generators were operable, but not required. All other plant system responses were as expected. Therefore, these two events have low safety significance.

The apparent cause of these two events is excessive turbine bearing vibration due to newly installed LP turbine monoblock rotors. Monoblock rotors are manufactured from a single forging with integral wheels formed by machining. The fact that the wheels are part of the rotor means that rubbing on the wheels can cause a rotor bow due to localized heating. This construction makes monoblock rotors more sensitive to rubbing than built-up rotors. In addition to the monoblock rotor sensitivity, the Millstone Unit No. 2 turbine rotor replacement includes all new packing. New packing also increases the possibility of a rub, as all the clearances are minimum.

## LICENSEE EVENT REPORT (LER)

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Millstone Power Station - Unit No. 2	05000336	YEAR	SEQUENTIAL NIMFR	REVISION NIMFR	2 OF 3
		2003	-- 006 --	00	

NARRATIVE (If more space is required, use additional copies of NRC Form 365A) (17)

**1. Event Description**

On November 27, 2003, at approximately 0617 with the plant in MODE 1 at approximately 20 percent power, the reactor (RCT) was manually tripped due to high vibration of the Main Turbine (TRB). Additionally, on November 28, 2003, at approximately 2205 with the plant in MODE 1 at approximately 11 percent power the reactor was also manually tripped due to high vibration of the Main Turbine. The two Millstone Unit No. 2 Low Pressure (LP) turbine rotors were replaced with monoblock turbine rotors. Past installations of this type of rotors have resulted in plant trips due to high vibration caused by rubbing. Therefore, this type of rubbing during initial startup was expected. Since this kind of rubbing was expected, applicable startup procedures were revised prior to start up to provide additional guidance in anticipation of turbine rubs. Rotor rubbing occurs when the rotating monoblock turbine rotor (as opposed to the shrunk-on wheels) contacts stationary components.

Following the manual reactor trip on November 27, 2003, all control rods inserted into the core. There were no safety system actuations and systems functioned as expected except as noted below:

- VR-21, a non-vital regulated instrument panel, transferred to its alternate power source. VR-21 was restored to normal.
- As a consequence of the VR-21 transfer, RM-8169, Millstone Stack Wide Range Radiation Monitor required database verification and Reactor Regulating Channel "Y" experienced excessive relay chatter. Both of these devices have been repaired.
- "A" Condensate Demineralizer man-way gasket failed - The Demineralizer was isolated, evaluated, and repaired.

All electrical busses transferred properly following the trip, and all emergency diesel generators were operable, but not required. All other plant system responses were as expected.

Following the manual reactor trip on November 28, 2003, all control rods inserted into the core. There were no safety system actuations and all systems functioned as expected. Temperatures were low after the reactor trip due to the normal response of the feed system with minimum decay heat. There were no other indications of abnormal Reactor Coolant System (RCS) temperature or pressurizer pressure. All electrical buses transferred properly following the manual trip, and all emergency diesel generators were operable, but not required.

The two manual reactor trips are reportable under the provisions of 10 CFR 50.73(a)(2)(iv)(A), any event or condition that resulted in manual or automatic actuation of Reactor Protection System (RPS).

**2. Cause**

The apparent cause of these two events is excessive turbine bearing vibration due to newly installed LP turbine monoblock rotors. Monoblock rotors are manufactured from a single forging with integral wheels formed by machining. The fact that the wheels are part of the rotor means that rubbing on the wheels can cause a rotor bow due to localized heating. This construction makes monoblock rotors more sensitive to rubbing than built-up rotors. In addition to the monoblock rotor sensitivity, the Millstone Unit No. 2 turbine rotor replacement includes all new packing. New packing also increases the possibility of a rub, as all the clearances are minimum.

**3. Assessment of Safety Consequences**

In both events, following the manual reactor trip, all control rods inserted into the core. There were no safety system actuations and all systems functioned as expected with the minor exceptions noted in the event description. All electrical buses transferred properly following the trip, and all emergency diesel generators were operable, but not required. All other plant system responses were as expected.

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (5)			PAGE (3)
Millstone Power Station - Unit No. 2	05000336	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 3
		2003	006	00	

NARRATIVE (If more space is required, use additional copies of NRC Form 365A) (17)

The risk associated with a reactor trip is considered similar as for any general plant transient. Therefore, these two events have low safety significance.

**4. Corrective Action**

The Corrective Action is to conduct a lessons learn from the Millstone Unit No. 2 startup to determine any changes required for future Millstone Unit No. 2 startups and applicability of these changes to Millstone Unit No. 3 startup (which will also have new monoblock LP rotors) following refueling outage 9, by February 15, 2004.

**5. Previous Occurrences**

No previous similar events were identified.

Energy Industry Identification System (EISS) codes are identified in the text as [XX].